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RAY HUGBEE WRETMENSEN, Editor
Of the Department of Geology and Geography at the University of Wisconsin

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The JOURNAL of GEOGRAPHY

Volume XVI OCTOBER 1917 Number 2

THE RELATIONS OF GEOGRAPHY AND WAR

By WALTER S. TOWER
University of Chicago

WARS are related to geography in two general ways. It is well known that the strategy of a war is largely determined by the geography of the country wherein it is waged, but it is not generally realized that most of the causes which force nations into war arise from geographic conditions. This second aspect is the more important part of the subject because the examination of causes of war suggests the answer to such world problems as the likelihood of making any peace permanent, and the effects on international politics which might come from a deliberate readjustment of geographic relations. It is well to begin the study of geography and war, therefore, with a consideration of causes, and then try to determine whether these causes can be removed or modified.

CAUSES OF RECENT WARS

The reasons for most of the recent wars, when analyzed, fall into three groups which may conveniently be called territorial, racial, and economic causes of war, all of them growing out of geographic conditions. Other issues, not at all related to geography, may be found in the events leading to some wars, such as was the case in the Spanish-American war. But with very few exceptions, in the last century or more, the big underlying issues fall under the three heads named. In some cases a single cause appears to have been mainly responsible, as in the influence of racial factors in the first Balkan War, or the clash of territorial interests which precipitated the second Balkan War. But in a good many, if not most, recent conflicts, two or all three of these typical geographic causes have been involved. It is advisable then to consider each cause in enough detail to know how it is likely to operate.

TERRITORIAL CAUSES

The territorial causes for war develop from two sources: the ambition to acquire new area, and the desire to recover area once occupied, but subsequently lost. These ambitions and de-

sires exist because nations, some large, some small, have developed in a more or less casual way in all sorts of locations, without intervening effective barriers to protect the weak from the strong, to check the clashing of rival interests, or to turn back the forces of aggressive expansion. None of the continents shows a close adjustment of national frontiers to prominent physical features. On the contrary, nearly all great nations have undesirable boundaries, such as those following insignificant streams or marked by purely arbitrary or artificial lines. This fact is shown strikingly by the map of Europe, and Europe in many ways has the most favorable configuration for logical subdivision. Along such unsatisfactory frontiers, rival interests or irreconcilable ideals may come so close as to set one nation against the other in deadly conflict; the notion that a relocation of the boundary might be advantageous may tempt one of the neighbors to try it; or the ambition for political aggrandizement may seem to have good chances of realization where no physical barrier stands in the way. Most of the wars in modern history show the presence of territorial causes.

Racial Causes

The racial causes of war, more prominent lately than ever before, exist because there are many distinct nationalities (people of common language and character) which are distributed without close adjustment to political boundaries or great physical barriers. The facts are illustrated better in Europe than in any other continent, because development of political units has gone farthest there. A growing spirit, called nationalism, has been strikingly manifest in nearly all these politically divided groups (like the Poles), within the last generation, due, probably more than to anything else, to the progress of education and well-managed campaigns in nationalistic literature. In general, nationalism may be defined as the idea of uniting all groups of one nationality under one rule and where an important group, like the Italians in Austria, is under a none too friendly domination, the issue may be acute. This development has increased friction between neighboring nations and fostered disloyalty among the races which are subject to an alien rule, as in the case of the Serbs in Austria or the Poles in Germany. The modern issue, known as *irredentism*, which figured so prominently in the first Balkan War and in the entrance of Italy into the present conflict, is only nationalism under another name.

Economic Causes

The economic causes of war have been of various sorts,

such as: the necessity of protecting industrial and commercial interests which are imperiled or interfered with by the activities of some rival; the desire to be freed from conditions which hamper industrial and commercial expansion; ambition to possess a larger share of the valuable resources of the world; and the need of providing for a rapidly growing, perhaps overgrown, population. Such issues are illustrated perfectly in the wars waged by Russia and by Japan during the last half century, and largely explain the present conflict.

Removing the Reasons for War

With these facts in mind, one may then consider the problem of removing these reasons for war. Of course, it ordinarily is assumed that geographic conditions are largely unchangeable, and, therefore, causes of war arising from geographic relations would be hard to eliminate. But for this discussion it may be assumed that any extent of re-adjustment of nations to their surroundings is possible, if such procedure would reduce the probability of war.

The only apparent way by which territorial causes might be removed is to relocate international boundaries, so that as far as possible they would adhere to the great natural barriers. In this way, countries would be made to correspond more or less closely to the larger physical divisions of the continents, and between neighbors there would be in most cases something of a natural limit to expansion, an obstacle to hostile operations, and a condition, therefore, which might tend automatically to decrease friction.

It must be noted, however, that the continents, as illustrated by Europe, have not the arrangement of topographic features needed to provide complete barriers for all the different national units for which provision would have to be made. Thus there would remain exposed frontiers across which friction might continue to develop as heretofore. Furthermore, as time goes on, physical barriers are becoming less and less effective as obstacles to hostilities, as shown by the Italian campaign in the Alps. Such an adjustment, also, would mean the elimination of most of the small nations of the world, since they occupy positions which are illogical when viewed from the physical standpoint. With the elimination of small nations, racial issues almost certainly would become more serious than ever, as, for instance, if Serbia were added to the Dual Monarchy, or Belgium to Germany. Finally, the physical units of the continents are of varying size and desirability, as a result of which, eco-

nomic inequalities still would cause jealousies and probably strife. Little relief, therefore, could be gained by redistribution of the lands among the many nations.

The only way to remove the racial issues would be to adjust political boundaries to the limits of national groups, and find some means to insure each unit a continued independence. But population groups are not distributed with reference to natural boundaries any more than they conform to existing political limits. For such countries, then, there would be a multiplication of exposed frontiers, one of the conditions most favorable for the development of international discord. Furthermore, racial groups vary greatly in numbers, and thus in strength, and they are not similarly located with reference to economic advantages. As a result of these unavoidable differences, the problem of the strong against the weak, or jealousy of the poorly endowed toward those more fortunate in their possession of natural resources, still would remain as reasons for war.

There is no apparent way of removing the economic causes, which seem of late to be the most effective of all in precipitating wars. The distribution of natural resources and other advantages for national progress is so complex that nothing like an equitable division among all nations could be accomplished. The location of important minerals, like coal and iron, or of highly productive crop land, bears no unvarying relation to the logical physical units of the different continents, or to the distribution of racial groups. The mere difference of location gives one area, like France, a vast advantage over another, like Hungary. Thus, however the adjustment of boundaries might be made on physical or ethnic bases, inequality of economic opportunities still would remain. In fact, every aspect of the question shows that there always must be some countries fortunately placed and heavily endowed with resources, while others, isolated and relatively poor, are likely to feel the urgent need of changing their status by force of arms.

Since it appears impossible to remove these causes of war, or reduce their effectiveness, one should then consider whether geographic influences are operating in new ways such as might produce more frequent or less frequent causes for war. Three reasons might lead to the conclusion that an increase is not unlikely.

Looking to the Future

The number of countries in the world is increasing. In Europe, for example, the last hundred years have seen the addi-

tion of ten new nations, and in other continents new countries have appeared, some of which already have ambitions to be recognized as world powers. The larger the number of nations within the limits of a single continent, the larger the number with world interests and far-reaching ambitions, the more favorable are conditions for war-provoking issues to develop. A hermit nation may be peaceful as long as it has no one with whom to quarrel, but Japan, after many years of hermit-like existence, began to develop outside interests and now has a record of participating in three wars in the brief space of twenty years.

National security arising from location, like the commonly mentioned "splendid isolation" of the United States, has disappeared, due partly to the development of new countries, but more largely to the ways in which man has conquered various natural obstacles. It is difficult to comprehend the changes which have come between the time when forests and swamps and rivers isolated the different tribes of Germany so effectively that they developed into independent kingdoms, and the present, with its remarkable ease of intercourse between remote parts of the world. Effective natural barriers hardly exist now. Distances no longer count for much and mountains which once checked peaceful intercourse are now the battleground for great armies. Even the ocean, long a most effective factor for isolation, now must be regarded as affording a remarkable degree of accessibility, within certain limits, perhaps the easiest avenue to follow for hostile purposes. Remoteness from centers of strife, great as its value may have been in the past, no longer can be counted on as a guaranty against war, for economic interests, far-flung, must be protected. The world is a unit.

Finally, with the steady advance of most of the long-settled parts of the world toward the full utilization of natural opportunities, there is greater chance for conflicts arising from economic interests and political ambitions. Economic and commercial domination by a single country, so typical of the past, has replaced by keen and bitter rivalry among a constantly growing number of near equals. A century ago there were but two first-class powers; today probably no less than eight nations must be so designated. A century hence there may well be a dozen, if the value of natural opportunities has been judged correctly. Economic needs, like problems of food supply, which did not exist a generation ago, now stand as primary issues in the affairs of great nations. Apparently, too, they must continue to increase. Areas and resources once secure from inter-

ference by any outside interests now are freely exposed to the covetous gaze and selfish ambitions of the hard-pressed nations of the world, as illustrated by Japanese activities in the Pacific. As long as nations continue to grow in population and material ways, and by such growth create pressure within their own limits, the impelling need for new opportunities elsewhere and the resulting conflicts of economic interests must be prolific sources of trouble. Under such conditions the tendency has been, and presumably must continue, for the strong nation to take what it needs from those unable to hold, as was the case in the Italian seizure of Turkish territory in Africa. Apparently, therefore, the ability to defend what is essential to the life of any nation because more than ever a vital part of its guaranty of existence, with less dependence than before to be placed on natural defences like distance, rivers and mountains.

It might be concluded from all these considerations that the increasing frequency of causes which have led to war will precipitate more and more conflicts, until the whole world is consumed. Such a gloomy future is, of course, not inevitable. Time may develop a more general attitude of national unselfishness toward territorial, racial and economic questions, as a result of which, all these issues may become less acute. However, this is hardly to be expected. The only other hope is in the increasing tendency for nations separately and collectively to prepare themselves in such a way that they can discourage hostile ventures by a covetous or aggressively-inclined people. A powerful league to enforce peace is, therefore, more than an idealist's dream; it seems to be a necessity.

Chicago, May, 1917.

AMERICAN PACKING HOUSES IN SOUTH AMERICA

The great American meat packing companies are gaining the same control of slaughtering and meat packing in South America that they have secured in North America. With their enormous capitol, years of experience, and complete knowledge of the business, they can dominate the business in South America even more readily than they did it in the United States. Already they have enormous packing houses in Buenos Aires, Montevidio and other River Plate cities. Armour and Co. are now building a plant near Sao Paulo, Brazil; it will have a capacity of 7,000 animals a day. South American meat is now extensively sold in the cities of the United States.

THE WEATHER FACTOR IN THE GREAT WAR. VII.* SPRING AND SUMMER, 1917

By Robert De C. Ward
Harvard University, Cambridge, Mass.

The Western War Zone

THE battle of the Somme, which began July 1, 1916, came to a practical standstill in November, owing to what was reported to be "an unusually early rainy season, and one of unusual volume as well." As official meteoroligical reports are not available, it is impossible to verify this statement. Bad weather did, however, certainly put a stop to the fighting. The comparative inactivity of the winter began. The Germans were thus saved from making a retreat which would probably otherwise have been necessary in the autumn of 1916. They spent their winter in strengthening their lines in the hope that these would hold through another summer, meanwhile placing more and more reliance upon the results of the submarine campaign which, it was generally believed, would bring England to terms within a comparatively few months. The British and French employed their winter in preparing for a new offensive. A semi-official report was given out that the battle of the Somme would be continued as soon as the weather "broke" in the spring.

The early resumption of the offensive in the spring of 1917 made it inevitable that there would be great difficulty on account of the changeable and stormy spring weather. The rains and mud of Flanders have, from the beginning of trench warfare there, brought extraordinary discomfort and suffering to the troops. The men have had to stand in water over their knees; often up to their waists. Trench stoves and drainage pumps have been in constant use. The wind also, unhindered by any obstruction in that flat and devastated country, has been a serious annoyance. Early in March the Germans began one of their retreats during a cold spell. The ground was hard and dry, and there was a fog. The time was doubtless carefully chosen, so that the thaw which followed, resulting in soft roads and deep mud, should hamper the British pursuit. Several reports mentioned German retreats during fogs. Changeable weather, varying from freezing to thawing, from clear to stormy, is to be expected on the western front in spring. Proper attention to meteorological

*Previous articles in this series have been published as follows: *Popular Science Monthly*, Vol. 85, Dec. 1914, 602-613; this Journal, Vol. 13, Feb., Mar., 1915, 169-171, 209-216; Vol. 14, Nov., 1915, 71-76; June, 1916, 373-384; Vol. 15, Nov., 1916, 79-86; Apr., 1917, 245-251.

conditions often enables an army to take advantage of the favorable spells for its more extended movements. This the Germans seem frequently to have done.

Until well on towards the end of April the weather was most unfavorable for military operations, and interfered very much with the Allied offensive. The British and French troops fought and advanced in spite of all obstacles. "Very wild weather," with an "equinoctial gale" and snow squalls prevailed on March 20-22; the German retreat slowed down in consequence. On April 6, Major Gen. F. B. Maurice, of the British General Staff, said "Our advance under the recent appalling weather conditions must be considered a splendid operation, for the snow there has been as bad as here (England), eight inches having fallen in the space of a few hours." Until after the middle of April the official reports continually mentioned snow, sleet, rain, gales, and cold,—"abominable fighting weather," as one despatch phrased it, with "blinding blizzards of snow." Yet the Allied troops "cheerfully carried out seemingly impossible tasks, although they were soaked and chilled to the marrow" and struggled "after the enemy up to their knees in mud." Finally, after weeks of treacherous spring weather, the last few days of April brought relief. The "brilliancy of the weather was reflected in the faces of the troops." The men sang again. Early in the month the troops were calling for hot drinks. At the end of it, they were fighting thirsty, under burning sunshine, over dry and dusty ground, and were calling for water to quench their thirst. May, June and July brought the usual series of weather types characteristic of the western front at that time of year. There were hot spells when the ground was dusty; when the men serving the guns were stripped to the waist, and when thirst was "the great demon in that shadowless land of craters," where the glaring ground was parched and cracked under the blazing sun. On the day of the Messines battle water was sent forward with two lemons to each man, "to help them through the barrage." The dry weather was not without its advantages, for the marshes no longer offered an impediment to the British advance. Then came cooler spells, after sudden heavy thunderstorms, or during general rains of longer duration which rendered major operations impossible. Major Gen. F. B. Maurice said of the battle of July 31, in Flanders, "the weather conditions were as nearly impossible as could be imagined—low clouds of great density, haze and mist. The observation was almost *nil*, and as a result the artillery was under a severe handicap, having to work without adequate airplane observation." The reports of August 1 mention the rain of

the last few days as "one of the most severe and most persistent experienced in recent summers." The craters, shell pits and new trenches were filled with water; the hardships of the men under shell fire and in the mud were greatly increased; the movement of the big guns was most difficult. A despatch dated Aug. 2 reads: "It is bad for fighting on land and worse for fighting in the air, but fighting goes on." The weather continued wet and stormy until Aug. 4, with little activity. Of the two opposing sides, the Germans had the advantage, for they had better cover, and were nearer their base, so that their supplies had to be brought a shorter distance. The British "tanks" sank deep in the mud, and many times their officers and crews had to get out, under fierce shell and machine gun fire, to "debog" them. Clearing weather (Aug. 5) began to dry up the roads and marshes; made aerial observation possible and the movement of troops easier. A partial German success (despatch Aug. 6) "was due entirely to the heavy fog which prevented the British gunners from seeing the signals which the infantry in the front lines gave, indicating the German advance." Stormy weather, floods and deep mud hampered the Canadian advance against Lens (Aug. 15). The infantry "was wallowing in the mud." "Mists" were on at least one occasion of help to the offensive. In the latter part of August (22nd), during the renewed fighting near Verdun, bad weather interrupted active operations and gave the Germans an opportunity to mass reserves for counter attacks. The last week of August was marked by a pause on all the western fronts, "inevitable after the great successes of the previous week and accentuated," as Major Gen. Maurice said, "by the bad weather which affected the operations all the way from the North Sea to the Italian seacoast."

In connection with the coming of the American troops to France several meteorological items may be mentioned. The heat in mid-July resulted in as much training as possible being done during the cooler hours of the early morning. Plans are already being made for winter clothing, and for heating the dining rooms and reading rooms, it being impossible to heat the various barns, lofts and farmhouses where the troops are quartered. The forest-green uniform for which the American marines in France contended, was selected for use in cold climates. As the marines have usually seen service in the Tropics, these uniforms have been little used.

The Eastern War Zone

Cold and unfavorable winter weather made extended movements impossible during the early spring (March 1-15), and then

came the usual thaws (Apr. 1), followed by the Russian revolution and resulting inactivity on the part of the Russian army. The Germans were doubtless unable to profit by the Russian situation on account of the impracticability of moving artillery and supplies across the marshes. Early in April the Russian War Minister stated, "the melting snows, which render roads and rivers impassable, preclude any big operations." The military head of the Russian Mission to the United States stated (June 23) that the long period of calm on the Russian front was caused "by terrible weather conditions." The weather being "now advantageous for military operations," a new offensive was predicted. During the operations after the middle of July, the Russians are stated to have been obliged to retire near Kalusz because several small streams, swollen by recent heavy rains, had overflowed and turned the lowlands into marshes. The same thing happened in 1916, during Brusiloff's offensive, but then it was the Dniester which overflowed, and hindered his operations. Major Gen. F. B. Maurice said, officially, on July 19: "Bad weather and floods have necessitated the drawing back of some advanced posts."

On May 24, north of Galitch, the Germans used gas, but a change of wind drove it back into their own trenches.

The Italian War Zone

Until about the end of March, the winter storms and deep snows prevented any large-scale operations. Snow tunnels were several times used in making surprise attacks. Snow storms, and "thick mists" and heavy rains, were taken advantage of as a means of concealment during advances. Early in April an Austrian general was killed by an avalanche during an inspection tour. "Bad weather" frequently hampered operations throughout the spring. Snow (until the middle of April), "blizzards," heavy rains and swollen rivers are noted in the despatches. The time for the main Italian attack about the middle of May seems to have been chosen between floods on the Isonzo River. The troops were able to cross on pontoons. Usually, at this season, the river is practically impassable except on fixed bridges. It is a time when the spring rains and the melting snows in the Carnic Alps cause the rivers to flood. The passage of the Isonzo was forced in a heavy fog. Italy's strong spring offensive on the Carso plateau could not be begun earlier on account of "terrible atmospheric conditions." Great difficulty was experienced because of lack of water on this dry plateau. Each day, according to one despatch, 450,000 qts. of drinking water were carried up for the thirsty men. Thunderstorms and occasional rains brought tem-

porary relief, both in supplying water and in limiting military activities. Early in July (10th), the Austrians began a night attack, on the Vodice, in a violent thunderstorm. In the darkness the enemy had almost reached the Italian positions when a sudden flash of lightning revealed the attacking party, which was completely repulsed. "Stifling heat" was reported late in August on the Carso plateau, but the Italian advance continued. It is worthy of note that the southern soldiers of Gen. Cadorna's army were especially mentioned for their valor and fighting abilities during the conquest of Monte Santo.

(Concluded in November)

MINERAL WEALTH OF SOUTH AMERICA—PAST AND PRESENT

By F. E. Williams
University of Wisconsin

Introduction

Doubtless mining was the first industry to give impetus to settlement in South America by Europeans. The presence of minerals had more or less influence on the native Indian people, early exploration, Spanish and Portuguese colonial policies, and the later national development of the South American republics. No attempt will here be made to discuss the origin or distribution of minerals. It is the purpose of this paper to point out some of the results brought about by the discovery and exploitation of rich mines in South America.

The Incas and Minerals

The great Inca empire was founded at least two hundred and fifty or three hundred years before the conquest of Peru by Spain (1532). Although these people were great agriculturists, they were also skilled in working the placer deposits for precious metals. Gold was used for ornaments, utensils, decorations in places of worship, and statues. The temples of the sun-god reflected the brilliancy of gold, silver, and precious stones. Silver-lead ores were smelted, and copper tools were in common use. Indeed they valued the copper more highly than either the gold or silver because of its greater usefulness. The amount of gold and silver collected by these peoples was extremely large, although probably overestimated. Such treasures probably represented centuries of accumulation. However, labor was cheap and hence the cost of production was small.

What effect the use of decorative minerals had on the artistic temperament of the Incas can only be conjectured. Perhaps decorative minerals stimulated them to the production of the fine structures whose remains are so abundant. Whatever the beneficial effect of this wealth on the Incas, we are certain that its presence proved their undoing. The gold and other precious minerals which had been gathered by the Incas spurred the adventurer on to hazardous deeds and led him to perpetrate monstrous cruelties which eventually not only destroyed the Inca empire, but broke the spirit and endeavor of a remarkable race.

Exploration and Conquest

No sooner had Columbus established a colony in the West Indies than the search for gold and silver began. This search led the Spaniards from island to island; from the islands to Mexico, to the isthmus of Darien, and to the continent of South America. A great number of well known explorers and conquerors touched or crossed portions of the South American continent. Such names as Balboa, Pizarro, Mendoza, Von Hutten, Valdivia, and Raleigh are known to most readers. Doubtless there are some explorers who were not seeking previous metals but the number was probably small.

It seems clear that most of the discoveries and conquests of South America are directly related to the influence of minerals. In nearly every case was the adventurer spurred on by the possible discovery of a new region of wealth not yet raided by one of his countrymen. And a large percentage of them found gold. Otherwise the incentive would not have remained so strong.

Settlement and Colonization

No sooner had the gold washings of Hayti been discovered by the followers of Columbus than the government of Spain took immediate steps to exclude other nations from the newly discovered regions. Thus the Spanish government maintained almost exclusive control over southern North America and most of South America.

Mining was carried on chiefly by enforced labor and hence the cost of production was slight. The life of the Indian miner was considered of little consequence by the European and the loss of an Indian meant to the mine overseer only a relatively smaller amount of gold produced. So long as Indians were plentiful this caused little concern. In 1573 there were available for the Potosi mines eleven thousand laborers; one hundred years later there could be found but sixteen hundred. Through such a system of enforced labor the ordinarily inaccessible regions

could be worked at a profit. The great number of abandoned mines reaching from the isthmus to Potosi show that mining was widespread.

Even in Chile, which was considered poor in minerals by the Europeans, the natives were made to work in the mines. Some of them rebelled and the unconquered Araucanians were a constant menace to the Spaniards so long as they held the colony in Chile.

According to the ideas generally accepted at the time of South American settlement, gold, silver, and other valuable minerals alone constituted the wealth of a colony. Hence we find the Spaniards fixing their attention on the precious metals regardless of other products.

Since Peru had the greatest wealth and the most perfect form of native government, it seemed natural to the Spaniard that it should be made the center of Spanish authority in South America regardless of the inconvenience of its situation and topography. Consequently the region around the Plata was late in developing for everything had to pass in or out via Peru and Panama. The Spanish government did not fear that they would lose seriously because of evaded duty on agricultural or pastoral products, but they were suspicious that outbound packages might have gold or silver secreted therein. But trade will follow the natural and easiest path and the result was much smuggling and a growing disrespect for authority which was later disastrous to Spain. So detrimental was this long, indirect route, that the first real settlements in Argentina came in from the west as a sort of overflow from Chile. It is clear, then, that in the case of Argentin, which was relatively poor in minerals, the policy of Spain was a serious drawback. The only compensating influence was that a few valleys of northwestern Argentina developed because they could raise provisions for the mining communities in the neighboring plateaus and mountains to the west.

The Plata regions were not the only agricultural communities to suffer. The Spanish authorities seemed determined that South America should produce nothing but gold and silver. Everything was subject to strict and often harmful regulation with the result that very early the fruitful fields and the viaducts which made irrigation possible were neglected. The laws were so formed that only mine exploitation was protected, and gold and silver were shipped in exchange for commodities from Spain. Another cause of agricultural decay was the enormous toll of Indian life taken to keep up and increase the mine operations. Under such supervision it is little wonder that the agricultural conditions steadily grew worse instead of improving.

The amount of gold obtained in the colonial period can only be estimated and often the bases for computation are rather unreliable. All writers agree that it was enormous. Mining of gold, silver, and quicksilver was carried on constantly by the viceroys of Spain. The quicksilver of Huancavelica was of great importance. This locality maintained for a considerable period an average of 670 tons per annum. The presence of the quicksilver was the only thing that permitted the extensive treatment of gold and silver throughout the Andean region. During the two hundred and nineteen years from 1570 to 1789 this mine is said to have produced $67,629,396 worth of mercury. The mines of Colombia produced upwards of $30,000,000 in colonial times. In the first ninety years the mines of Potosi alone produced $395,619,000 and between 1545 and 1800 the king's fifth from the output of these mines was $163,000,000. On this assumption the output of the mines for the above named period was $815,000,000. One writer says (an estimate based on fragmentary evidence) that in the two hundred forty-eight years up to 1740 Spain received from all possessions of America $9,000,000,000.

This "precious metal" policy of the Spaniards not only retarded progress, but in many cases caused an actual deterioration. The immense products obtained from the mines of South America in the sixteenth, seventeenth, and eighteenth centuries had many evil effects on the Spanish colonies. In the rich mineral producing colonies the most direct effect was to enrich a few without personal effort and to weaken the reliance of the colonies upon agriculture. The abundance of precious minerals on the South American continent was responsible for its colonies having a less substantial development than those of North America. "In the long run, the fabulous wealth of Mexican and Peruvian mines proved of less account than the corn-lands and the forests and iron mines of North America." *

The influence of minerals on the Portuguese colony of Brazil was less marked but is worthy of mention. The quest for precious metals was probably incited by Indian legends. As early as 1600 the Paulistas began this search, which was continued for many years in connection with slave hunting. The Portuguese found gold near the close of the seventeenth century and diamonds in the early part of the eighteenth, both in the province of Minas Geraes. Perhaps the greatest productiveness of the gold was from 1752 to 1761, when the annual yield was six million dollars. Brazil was the leading producer of diamonds until the opening of the South African fields. Perhaps the best estimate

* Enock, C. Reginald. The Republics of South and Central America, 1913, p. 25.

of the total output of diamonds from 1729 to 1885 lies between sixty million and one hundred million dollars. There were several rushes to the gold and diamond fields; there were disturbances and even rebellions because of the harsh mining laws; but the influence of minerals in Brazil was much less far-reaching in its effects than in most of the Andean colonies.

Fortunately for the natives of Brazil the discovery of gold came much later at a more humane period than that of the conquest in western South America. Furthermore, Indians were harder to obtain in Brazil, and Negro slaves were taken from the plantations, already short of labor, to work in the mines of Minas Geraes.

National Development

During the period of revolt against the Spanish crown and for some time afterward, mining suffered a decline in nearly all parts of South America. This was due in part to the political disorder, violent for a time and spasmodic for a large part of the nineteenth century, and in part to the restrictive mining laws. The latter part of the nineteenth century and the first part of the twentieth have been marked by new and better mining codes and more stable governmental conditions so that there has been a revival in mineral production.

At the present time the output of gold from South America, the once famous El Dorado, is the least of all the continents. It still holds next to the highest place in the output of silver, but it is only a distant second to North America. The total output of all minerals of the South American continent is of relatively small value; although among the countries of the world, Chile ranks first in nitrate and sixth in copper; Brazil, first in monazite sand (much used for gas mantles), second in diamonds, and third in manganese; Peru, third or fourth in silver and ninth in copper and petroleum (1/250 of the output of the United States); Colombia, second in platinum, but is far behind Russia; Bolivia, high in silver, first in lode tin, and one of the first three in total production of that metal; and Venezuela one of the leading producers of asphalt.

If we consider the two great fundamental minerals of most economic consequence, coal and iron, we find that in the whole of South America the latter is barely mentioned as actively mined, and the former is about 1/800 of the world's output, nearly all from Chile. There are, however, high grade iron ore reserves in Brazil estimated at over two billion tons and the province of Minas Geraes will no doubt be one of the important world sources of iron ore in the near future.

Of more interest to us in this discussion is the relation of mineral output to the other products of South American countries. In Argentina, Paraguay, and Uruguay minerals are of little consequence at present and have played practically no part in the national development. The Guianas are dependencies and mining occupies the attention of but a small number. Ecuador, Venezuela, Colombia, and Brazil have depended somewhat upon minerals and their present output, at least of the last three, forms a fair portion of their resources. Of Venezuela's exports, asphalt and copper are important. Colombia's relative production is somewhat smaller, while Brazil's total mineral production is but a small fraction of her total exports. The three remaining countries, Bolivia, Chile, and Peru, have been much more influenced by minerals. In 1906 Peru's mineral products were nearly one-fifth of her total exports, while in 1910 they were over one-fourth. Bolivia's most important export is tin. Her export of tin in 1909 was about one-half of all exports and in 1913 was over two-thirds. Second place in exports is held by rubber, but third, fourth, and fifth places are given to silver, copper, and bismuth. Chile's exports in 1910 were almost five-sixths minerals and continued in about the same proportion up to 1916; most of this was nitrate, which was in 1911 second to coffee in value among exports of the continent. Of the eighteen most important ports on the west coast ten are exporting ports and eight of these are in the nitrate group. Such a large production of minerals in Bolivia, Chile, and Peru could not help affecting the economic and political conditions in these countries. It was the value of the nitrate deposits that caused the war of 1879 in which Bolivia, Chile, and Peru were involved. Indeed the presence of minerals practically controls the distribution of population in the high plateaus and valleys of the Andes.

In the future new fields of mining enterprise may be developed. Large treasure will doubtless be taken from the mountains for centuries to come. The fact that large amounts were produced in the past by an enforced labor system does not necessarily mean a renewal under modern conditions. There are over 10,000 abandoned silver workings in Bolivia. Doubtless a large percentage were abandoned on account of labor conditions. Certainly the nitrate will continue to dominate Chile as long as the demand remains and the supply holds out. Tin and other minerals will be of great importance in Bolivia, and copper and silver will have an important share in the exports of Peru. Of the other countries Brazil will probably reap more benefits from minerals because of its vast reserve of iron ore. The lack of coal is a serious drawback throughout South America and under present

conditions it can only be partially compensated for by water-power. Improved methods of transporting and applying electricity may at some future time very largely supply the deficiency of coal. Coal is now the greatest of all imports in tonnage and controls to some extent the trade in other products. Most South American countries have passed the stage where the precious metals are the most important factors and in the future the agricultural and pastoral industries will engender more substantial progress even in the Andean countries.

SUMMARY

The Incas accumulated a large amount of precious metals which to them were of use for utensils and ornaments, but were not of so great usefulness nor valued so highly as copper. The presence of these accumulated metals and of the mines already worked, together with the newly discovered deposits, led a number of adventurers to undertake hazardous expeditions, to inflict some of the worst cruelties known to history; it caused Spain to adopt a policy of exploitation which although fruitful to the home country at the time, was harmful to the colonies and in the end disastrous to the Spanish nation. Brazil has benefited by mining and will further develop her enormous mineral resources in the future. The other countries east of the Andes have produced but few minerals and have prospects of but little mining development. But the Andean countries have been much influenced as nations and will have their policies modified in the future to a greater or less extent by mineral output; especially is this true of Peru, Bolivia, and Chile.

SOME POINTS ON THE PREPARATION OF GEOGRAPHIC TEACHING MATERIAL

By H. D. GROSE
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1: PREPARATION OF MAPS FOR DESK USE

THE fate of contour and other maps used for desk study by pupils under ordinary conditions is all too well known. Such maps speedily become soiled by finger prints and dust films; they are also liable to defacement by pencil marks, ink blots, and other marks, accidental and non-accidental. The most careful supervision usually fails to prevent this, particularly in large laboratory sections. More especially is this the case when the map serves as the basis for a written report. Pupils have an instinctive tendency, in making their study, to locate points of

reference with a pencil or pen. Many repetitions of this process render such points of reference very easy for succeeding students to find, but lend neither beauty nor teaching value to the map. An inked pen point leaves a mark not to be mistaken, even by the most innocent.

Several devices for the prevention of this result have been proposed. Plate-glass desk-tops, under which the map may be placed for study, have been used with good results. Frames, similar to picture frames, with glass or sheet celluloid cover-plates, are also in use. Transparent tissue, pasted over the face of the map with colorless mucilage, serves the purpose fairly well; it is easily removed by dampening when soiled. When classes are few and small, unprotected maps, provided with check-marks, may be assigned to individual students, with assessment of fines for defacement. But glass is rather expensive and is liable to breakage. Celluloid is expensive and easily scratched. Frames are clumsy and noisy to handle; the frequent changing of maps entails much unnecessary labor. The fine system is conducive to ill-feeling and evasions of honor. Meanwhile the unprotected map goes its merry way slowly but surely to defacement and the scrap-heap.

It is a common and valuable practice to prepare maps for class-room service by backing them with muslin. This is a time-consuming and costly operation which cannot be often repeated when, as is usually the case, the appropriation for equipment is small. The common result is the prolonged use of maps which, from much handling, are both unsightly and unsanitary.

Coating Maps With White Shellac

A simple device obviates all of these difficulties. While the maps are still upon the mounting-board, and after they have become bone-dry, they may be varnished with a light coat of white shellac. The varnish should be thin enough to spread readily without showing brush streaks. With a soft brush of moderate width this operation may be quickly and easily performed. If profile lines or other reference marks are desired upon the maps, they should be located before the varnish is applied.

The varnish coat is quite resistant to abrasion by pen and pencil point. It does not take pencil marks readily. It is water proof and thus prevents ink blots from reaching the map face. When the varnished map becomes soiled it may be quickly restored to cleanliness by means of a soft dampened cloth or sponge.

Ordinary varnishes are not advisable for this purpose, as

they are too liable to crackling, which renders the map illegible. Moreover, they dry slowly, and tend to penetrate the body of the paper, causing an untidy appearance through streaking. Most disagreeable of all, they darken rapidly, adding to the difficulty of reading the map. Thin, white shellac varnish is free from all of these objections.

The teacher who has the wholesome penchant for making wall maps, graphs, and diagrams, will find the above an efficient means of greatly prolonging their usefulness. In the final trimming of cloth backed maps, it will be found that rounding the corners with the shears or a die will add to the appearance of the map and will in large measure prevent the tendency of the map to strip from the cloth backing.

2: Enlarged Maps

In the introductory work with contour maps, it is frequently desirable to have for general discussion a large wall copy of the map upon which the study is based. So far as the writer is aware, such maps are not published; and they would probably be too expensive for general use if commercially available. Where photographic apparatus and a stereopticon are at hand, they may be easily made as follows:

(a) Prepare a process-plate of the desired map.

(b) Project this with the stereopticon upon bromide paper and develop in the usual way as per directions which accompany each package of paper.

(c) Mount the bromide enlargement in the manner customarily employed in mounting maps.

In practice, it is usually inconvenient, with the equipment ordinarily available, to secure a satisfactory enlargement of an entire contour map at one operation. It is better to prepare four or more negatives, each covering a corresponding fraction of the map. This will insure greater sharpness throughout the whole finished map, and obviate the difficulties encountered in manipulating large sheets of photographic paper. Needless to say, the several negatives should be of uniform density and size—conditions which the photographer of ordinary skill will easily know how to secure. If regular bromide enlarging apparatus is available, the results will be none the less satisfactory. Trays large enough for the manipulation of photographic paper of suitable size are generally not at hand. They may be easily provided by constructing a wooden tray of suitable depth—three or four inches—and appropriate length and width, lining the same with cheap white oil-cloth. A still better practice is to construct a tray with tight joints and paint it, both inside and out, with two

or three coats of hot paraffine, heavy shellac varnish, or better still, with the "tray enamel" to be secured from the larger photographic supply houses. Care should be taken to fill all cracks and joints thoroughly with the coating material.

By the photographic process above described, enlarged detail sections may be prepared, to facilitate the presentation of particular problems involved in the study of the map. Such enlargements of harbor maps, of mountain passes and other physiographic details playing so important a part in the control of human activities, are of especial value in commercial geography and history classes when the stereopticon is not available, or when it is desirable to have such material for some time on display for students' individual study.

3: Lantern Slides

The use of lantern slides is so well known that it would seem unnecessary to more than point out the value of adding to the collection a series of prints from the negatives prepared for the above purposes. But the recent perfection of inexpensive high power incandescent lamps for the stereopticon, utilizing the ordinary lamp service, has almost revolutionized the use of the lantern in the class room. With this equipment available, the stereopticon need no longer be the thing of occasional use when time can be found or made especially for that purpose, but the desk stereopticon becomes the ever-ready means of instantly illuminating the subject under discussion. With the slides at hand, a turn of the switch button throws the illustration on the screen the moment it is needed. The slide no longer remains a teaching luxury, it becomes a teaching staple of increased value because of its ready availability. Hence the addition of such slides as indicated above is all the more desirable. Diagram slides of great variety and value may be easily prepared by tracing the desired figures with a fine pen and India ink upon glass plates of lantern-slide size. The method has been described in full in a previous number of the Journal of Geography.* To facilitate the use and increase the value of the slide collection, a systematized storage plan is all essential. From the standpoint of flexibility and accessibility none better than the box unit system has as yet appeared.†

4: Duplication of Special Material for Student's Use

There are many maps, diagrams, and pictures whose teach-

* Vol. VIII, pp. 135-136.

† William Herbert Hobbs: The Use of Lantern Views with Science Lectures, Journal of Geography, Vol. VII, pp. 180-186.

ing value would be very great if only they were readily available. Unfortunately, such material is too often buried in bulky reports or in books not readily accessible when needed. The obvious means of utilizing it is the preparation of a lantern slide copy of the desired figure.

It is occasionally highly desirable to provide each student with a copy of some particular graphic material. Such copies, of desirable size, may be prepared in any number, as per the suggestion at 2 above, from the process plate negative from which the slide is made. For the sake of rapid and convenient printing, the preparation of a 5 x 7, or larger, process-plate negative will be advantageous, since in producing a large series of prints the direct printing process is far speedier than the projection method. Any of the several developing papers now on the market will be found convenient for this purpose. The use of a matt surface paper will permit the coloring of maps thus prepared with either crayon or water color.

5: Preparation of Outline Base Maps

While there are several series of such maps commercially available, they are rather expensive in proportion to their value, they are often of unsuitable size, and frequently the desired base map is absent from the series. There are two good methods of producing such maps on a large scale: (1) by means of the hectograph, (2) by means of the mimeograph. The former apparatus is described below. The latter is now so commonly a part of the office equipment of the school, and its use is so simple and satisfactory, both as to quantity and quality of results, that it should be preferred whenever available. The procedure is as follows:

(a) Lay the blank stencil upon the map whose reproduction is desired, securing it in place by means of thumb-tacks, paper clips, or other device to insure permanent register.

(b) Trace in the outline with the stylus in accordance with the directions provided with that instrument.

A little practice will enable the production of highly satisfactory maps and diagrams by this method. Once the stencil has been prepared, as many copies as needed may be made. The recently introduced Dermatype stencil is especially suitable for this purpose, since it may be cleaned and filed away for future use after the first run has been secured, thus making the production of outline maps by this method very inexpensive indeed.

In tracing the outlines upon the stencil, it will be found help-

ful to work by transmitted light, particularly when working with the Dermatype stencil which, unfortunately, is at present a tinted product, a serious disadvantage in tracing from colored maps. Several devices for securing transmitted light will suggest themselves. A convenient one is an inclined frame similar to the retouching rack, but larger. The design of this may be secured by a visit to a local photographic studio. Perhaps the simplest and least expensive to prepare consists of a good-sized box, open at the top, with an incandescent electric light bulb inside. Lay a sheet of ground glass over the opening, place the map and stencil upon the glass, switch on the light, and the apparatus is ready for use. In the absence of ground glass a sheet of white tissue paper pasted upon the under side of a sheet of plain glass will be found a good substitute. Incidentally, the above device makes an admirable printing machine for gas light photographic paper.

6: Preparation of the Hectograph

Where the mimeograph is unavailable, the hectograph may be used to good advantage. There are many forms of this device upon the market, usually at prices too high in proportion to value received. The hectograph is not difficult of construction, and may be made in any size desired by the user.

Hectographs are of two general types, kaolin and gelatine. Either type is good. The latter is somewhat more satisfactory, though less easily prepared. The *modus operandi* is as follows:

(a) *Kaolin Hectograph.* Into a tray of suitable size place enough dry white kaolin to fill tray to a uniform depth of about three-fourths of an inch. Add glycerine and thoroughly incorporate until kaolin is free from lumps and is of the consistency of very stiff putty. Level off smoothly, and the apparatus is ready for use as described at *c* below.

Kaolin may usually be secured from the larger dealers in artists' supplies; it should cost about fifteen cents a pound. It is advisable to purchase in five-pound lots for the sake of economy in price and because of the necessity of an occasional addition to the tray to make up for losses in washing off old copy. Should the kaolin become too dry, thus reducing the number of copies obtainable, add glycerine and rework to the original consistency.

A tray 10 x 12 x 1 inches will be found convenient; it should be provided with a snugly fitting cover. The local tin-smith will be able to make such a tray at a reasonable rate.

A satisfactory levelling device is made of hardwood in the form of a T-stick, the cross arm being cylindrical with rounded ends; it should be slightly shorter than the width of the tray.

After the kaolin surface has been smoothed as well as possible by hand, lay upon it a piece of medium weight hard paper and with the T-stick rub it down to absolute smoothness. The printing bed should be relevelled in like manner after each using.

When the kaolin tray is not in use, it should be covered with a thick cloth of white, non-linting goods, dampened in glycerine. The tray should be stored upside down, to prevent evaporation of glycerine.

(b) *Gelatine Hectograph.* Formulae for the gelatine hectograph are numerous, and may be found in any of several books of formulae at the public library. Pure gelatine, which is usually demanded by them, may be secured from the druggist at varying prices, usually high. A very good formula of this type was published in a recent number of the *Journal of Geography.* * Another good one is as follows:

White Gelatine (or white glue).....4 ounces
Glycerine ..... 16 fluid ounces
Rainwater ..... 10 fluid ounces
Carbolic Acid ..... a few drops

Put all together in a granite vessel and soak twelve hours or more; melt over a slow fire or in a double-boiler. When thoroughly melted, pour into a shallow metal tray (see a preceding paragraph; the present formula is designed for the tray there described); skim off bubbles with a knife or card edge, set level until cool. It is then ready for use. If the printing bed is too soft, remelt and evaporate some of the water; if too hard, causing the surface to peel or crack when in use, remelt and add a little water.

(c) *Use of the Hectograph.* The method of using the Hectograph involves the following steps:

1. Prepare the desired copy upon hard writing paper, using hectograph ink or copying pencil, and uniform pressure in tracing.
2. Wash the face of the Hectograph with a soft sponge and tepid water, applying liberally and immediately draining.
3. Soak up surplus moisture with soft absorbent paper until printing face appears dry. Newspaper is excellent for this purpose.
4. Place copy face down upon printing face, rub into thorough contact, and allow to remain five minutes or longer, depending upon number of copies desired; then remove.

* Vol. 14 (January, 1916), p. 143.

5. Quickly rub into contact with hectograph face a sheet of blank paper; remove, and repeat until the desired number of copies is obtained.
6. Wash hectograph face immediately after use with tepid water to remove all traces of old copy; it is then ready for new copy or for storage.

With the gelatine type, it is not necessary to remove old copy by washing if some time is to elapse before next use, as the ink will in time sink into the body of the hectograph. Washing is to be preferred however.

Hectograph ink may be secured from the stationer's shop, and gives the maximum number of copies, often as high as sixty or more satisfactory duplicates. Copying pencil is easier to use and usually suffices where not more than twenty copies are needed. If desired, typewritten material may be reproduced by the hectograph; the original copy should be made with the copying ribbon or with the copying-carbon paper. The latter is, if anything, even better than the ribbon for this purpose. The possessor of the Hectograph will find a host of applications for this useful device—indeed, its uses are almost without limit in variety.

All of the above suggestions have been utilized by the writer to advantage, and are passed on with the hope that they may prove equally helpful to his fellows in the profession.

A PHILIPPINE FIESTA

By Hadwen Harry Williams
Bureau of Education, Manila, P. I.

EVERY Philippine town has annually a celebration or fiesta in honor of its patron saint, when people come from all the nearby towns to see the processions, watch the open-air theatre and enjoy the merrymaking. It is the most important holiday of the year, and no Filipino will miss a town fiesta if he can possibly help it.

For some reason the little village of Bambang up in the mountains of Northern Luzon had not had a fiesta since 1898, but lately there was one almost grand enough to make up for the eighteen years. There were to be so many events of interest that it would last for two days, so one Monday morning we sent our baggage to Bambang on packhorses, and followed on horseback when the sun had dropped behind the mountains and the air was cool. Everyone seemed to be going to the fiesta, some on foot, some

in ox-carts, and some riding horses of carabaos. With food, extra clothes and blankets, they were prepared to stay till the end of the events.

From the church was flying the papal flag of white and yellow; from the bamboo stage erected in the plaza fluttered the Stars and Stripes near the Belgian flag, the latter indicative of the Belgian priests who work in this province, Nueva Vizcaya. The plaza was full of people listening to the music of the two competing bands from neighboring towns. Boys in clean white drill suits talked with gaily dressed senoritas, while their parents conversed about the rice and tobacco crops. At the cockpit a noisy crowd were betting on two roosters, while along the streets vendors were selling rice-cakes and all kinds of sweets. The days of cockfighting are numbered, for the Filipinos have found baseball to be more interesting and not so hard on the pocketbook.

The first number on the stage was an imitation battle between two groups of the non-Christians. These are the wild people who live far back in the mountains and are the least civilized of any of the people in Uncle Sam's island possessions. After a promise of beads and brass wire for anklets, they had agreed to attend the fiesta and appear on the program. Gaudily decorated with anklets, bracelets, beads, white horsehair and red cloth, their nearly naked bodies appeared to be as well developed as those of many athletes. To the beating of a crude drum they fought with spears and shields, with bows and arrows, though of course no one was injured; and then followed some of their dances. While a big brass gong was sounded, a man and woman gave the marriage dance; then followed the victory dance, which was accompanied by much shouting and brandishing of spears. It was hard to realize that this was not merely a show, but that these people were doing just as they so often do in their rancherias in the mountains.

Then followed a comedy given by some of the people of Bambang in the Isinay language; for though English is the official language and is used in the schools, many of the older people do not understand it, and it is not yet the language of the stage or the church. The crowd stood on the ground in front of the stage, and interestedly watched the lovemaking of the actors who stood under a bower of palm branches and banana leaves, illuminated by the light from Chinese lanterns. At intervals there was music by the band, and when the spectators became tired, they sat on the brick wall of the patio. The wall, church, and belltower are in an excellent state of preservation, though they were built by the Spaniards in 1786.

After the performance there was a dance in the largest

house in town, for the Filipinos are fond of dancing, even if this is a tropical country. The first dance is always the stately Spanish rigadon, a gay scene with many trailing gowns and polite bows. But one must get some sleep if one is to enjoy the fiesta the next day, and far into the night orchestras could be heard as they went about the town serenading town officials and popular young ladies.

There were more imitation battles given by other tribes of the non-Christians, but this time the stage was too small, and in the shade of a little structure erected by the priest for his American and Belgian friends, we watched the fighting on the plaza. To give it the effect of a pageant, a Spaniard with an air rifle and some men with spears came and appeared to kill or capture all the wild people. Then they came up before the provincial officials, laid their weapons on the grass and gave a loud cheer. They were now through with their part of the program and were given their reward of beads and wire.

It is customary at a fiesta to have the "Moro-Moro." This play is given on the stage and represents at great length the capture by the Spaniards of the Islands in early times. Sometimes it is given three hours every night for a week. It is always given in the local dialect and most Americans can only guess at what is going on among the actors. There are plenty of thrills and sword-fighting; finally, after a beautiful princess is captured and recaptured, the Spaniards take possession of the Islands in the name of the King of Spain. It has been played for years in nearly every village in the Philippines.

At two in the afternoon, the padre had a banquet for his guests in the *convento,* his residence near the church. Outside the open-air play went on, with the people cheering and the band playing, and a blinding sun beating down on hundreds of opened umbrellas, which the people always carry, as either sun or rain is likely to be unpleasant.

In the evening there was a representation of the discovery of America, with Columbus, the Indians, and a boat. This was the closing number, and when it was finished our servants were waiting with the horses, ready for us to start back to the provincial capital. The fiesta for Santa Catalina de Sena had been a great success and now will probably be repeated every year.

TWO INDUSTRIES OF MADAGASCAR

Two interesting industries have been developed in Madagascar, The Great African Island which is only two hundred fifty miles off the southeast coast of Africa. One of these is the silk

industry. The Halabe is a silk producing spider which is indigenous to the island. These spiders have an unfortunate habit of devouring each other when hungry, and consequently they multiply only in places where there is sufficient food. The process of reeling the silk from the spider is a peculiar one. From twelve to twenty-four spiders are placed in a frame with a special compartment for each one. The operators touch each spider and the thread of silk, which becomes attached to the finger when it is withdrawn, is carried with the threads from the other spiders to a hook that joins the threads into a single one. This thread is later wound on a bobbin. Care must be taken not to injure the spiders because they can be subjected to four or five reelings, which represents about four thousands yards of thread. When this process is finished, the spiders are placed in a "park" made of bamboo planted in the ground and connected by strings so as to make a trellis. In a few days' time those that have not been eaten up are put through the same process again. The silk of the Halabe spider has a pure, brilliant yellow color and is very elastic and tenacious, qualities which make it superior to ordinary silk.

The other industry is that connected with the rafia palm. This palm grows everywhere along the coast and does not require cultivation and attention. It grows to a very large size, each branch being almost a tree in itself. The ribs in each branch are usually twenty feet long and contain a light pith which, when split up into layers, is very light and strong. The natives use it for ladders, shafts, and various other things. Each branch of the palm produces from eighty to one hundred green leaves from two to five feet long. The under part of the leaf has a pale green color and can be pealed off much the same as the skin on a pea pod. When dried in the sun, it becomes a light straw color. This is what is called rafia. The natives originally used it for clothing, but now the gardeners and nurserymen use it for tying up vines and for grafting. The supply seems to be inexhaustible and is limited only by the supply of labor.

BLANCHE McCARTHY.

FIRES IN CHINESE CITIES

When a fire starts in a Chinese city, it is difficult to confine it to a single house; and if no more than a score of families are burned out, the neighborhood is fortunate. At least this is true in South China. The houses are built of lath and plaster on a wooden frame, and roofed with tiles which are thin and brittle.

The larger houses have some or all of the walls of brick or adobe, and they may escape; but where one wall, either of mud or of lath and plaster, serves for two adjacent houses, the chances of escape are not many.

It is an interesting sight to see a fire company going to a fire; but it lacks the thrill of the galloping horses and dashing engines which we are accustomed to in the United States. In place of the horses, and the men in waterproof attire, a company may consist of fifteen or twenty men walking at little more than ordinary gait, and dressed in cotton clothes, with waterproof hats of bamboo, and with feet bare. In place of the smoking engine and the long hook-and-ladder truck, there are wooden clubs, hooks, and banners: the clubs and hooks are for use in tearing down adjacent houses so that the fire will die from lack of nourishment; the banners are to show what fire company it is. And in place of the clanging bells of the engine or hose cart, one man in each company carries a brass gong which he pounds. In the larger cities where western influences are being felt, there are a few force pumps which are dragged or carried by men and worked by hand power. To these are attached lines of hose which furnish a small stream and can be used as high as the roofs of the single story (or occasional story-and-a-half) buildings, if the nozzle can be carried to within twenty or thirty feet of the point where the water is needed.

There is little danger of a fire spreading by the falling of burning brands upon the roofs, and the houses may be gutted before spectators on the hill see any sign of its being on fire. But suddenly the shell cracks, and the roof falls crashing to the ground. Thus house after house becomes a prey to the flames until (if there is no wind) some house may have been so thoroughly soaked by water that it checks the fire; or until a space is reached where the houses have been completely demolished by a fire company; or until it reaches a fire wall. Fire walls are of brick or adobe, a foot or eighteen inches thick, and extend above the roofs of the houses; they have openings only where they cross the streets, and these frequently have sliding doors of sheet iron which may be closed in case of fire. Such walls are built in both directions through the city, at distances of 200-300 feet from each other, and are built expressly for this purpose of checking fires.

Fire ordinances and regulations seem unknown. Insurance rates of course are high, but advantage is often taken of a fire in the neighborhood to burn one's own house for the sake of the insurance; during a recent fire in Foochow, fires broke out in no less than twenty places in the vicinity before the flames from the

original fire had actually spread that far. Perhaps the nearest approach to any regulations is the custom which demands that the owner of the property where the fire started cannot rebuild until all others whose property was destroyed have done so; and all the debris caused by the fire is dumped on the spot where the fire started. The owner of this property must see broken tile, stone, and other useless rubbish piled hill-high on his land from all the other devastated property before he can clean up and rebuild. Everything which can possibly be used will have been removed, even while the flames were at work: smouldering and charred timbers are carried away to be used for fuel, if for nothing more valuable, and the ruins and debris are raked and picked over for everything of the least value that flames could not destroy, even to the rusty nails.

WALTER N. LACY, Foochow, China.

GERMANY'S PROJECT OF EASTERN EMPIRE

FORTUNATELY or unfortunately, depending on your point of view, Germany's development as a great power came late in the world history. The colonial spoils of the world had been divided among older nations when the empire was born in 1871. Consequently Germany had to be content with what she had, or win by armed conquests the dominions of other nations at home or abroad. Within a few years of its birth, the German empire had bounded in a few record-breaking leaps from a quiet community devoted principally to agricultural pursuits to an industrial and commercial power. Without this transition the magnificent plans of Germany's architects of fortune could never have been realized even to the measure now accomplished. The launching of Germany on her career of industrial and commercial success, her era of wealth production, may be said to mark the real starting point of her race for world dominion.

The German policy of creating a Middle Europe under the sway of the Hohenzollerns (so naively explained by our government a few weeks ago and published in the press throughout the country as if it were a new discovery of German political aims) was born in the minds of Germany's ruler and his closest associates years ago.

By her alliance with Austria-Hungary, Germany has practically dominated the political destinies of the dual monarchy of late years. By dynastic manouvers she attempted and partly succeeded in securing the virtual vassalage of some of the Balkan states. Serbia alone was irreconcilable, a weak Slav power, but

belligerently opposed to Teutonic advances. Bulgaria was secured through the agency of a German Prince on the throne at Sofia. Rumania likewise was supplied with a German ruler of the house of Hohenzollern. The Greek monarch of the present Danish house, originally German, was wedded to a sister of the Kaiser,

and German officers tutored and influenced Turkish troops armed with German rifles and Krupp cannons. The Kaiser's courtship in Constantinople began when he ascended the throne. On November 8, 1898, Emperor William speaking in Damascus addressed the following honeyed words not only to the Turks, but to the followers of the Prophet in Egypt, India and China:

"May His Majesty, the Sultan, as well as the three hundred million Mussulmans who venerate him as their Khalifa, be assured that the German Emperor is their friend forever."

About a year later, Germany had secured her first concession for the Bagdad railway, the proposed road of steel over which the German empire was to be projected to the Persian Gulf.

The right of way was practically clear. There was first of all Austria-Hungary, by its very nature an artificial state composed of half a score of mutually jealous nations, held together by a single individual, Emperor Franz Joseph, a crumbling old man. Political prophets foretold the collapse of the Dual Monarchy with the aged ruler's death. The Balkans were occupied by Slav and Latin races, hating one another, and always ready for a fight. The Turks, a noble race originally, were gradually decaying under the blight of Mohammedanism.

German university professors, German political leaders, the spokesmen of Pan-Germanism the world over, looked to Asia Minor as the only undeveloped field for German enterprise without the loss of German citizens. This plan was to be worked out in complete friendliness with the Young Turk Party,—which British diplomacy had not cultivated. It is really surprising that Germany risked war to accomplish her aims, and there is little doubt now that she would never have taken a warlike step for accomplishing what she planned and what could have been wrought by peaceful means under the shadow of the German military machine, if the individuals who think and plan for the German empire had not made a few serious mistakes in their reckoning. They misjudged England. They gambled on English labor and social troubles and the Irish question. They thought John Bull would hesitate till France was conquered. Otherwise the German Emperor would have assumed the pose of a Peace Angel when the events in the Balkans upset Germany's plans and placed barriers in her path leading from Hamburg to the Persian Gulf, surveyed and mapped, planned and plotted with German thoroughness.

There was nothing left up to the time of the Bucharest treaty, which terminated the Balkan War, but to push through the railroad to the Persian Gulf. That being accomplished, Emperor

William undoubtedly planned to convince Austria-Hungary, the Balkan States and Turkey by arguments and some clinking of spurs that it was to their material advantage to enter into a Customs Union with Germany. There is no reason to doubt that all these states would have benefited financially by such a move. Once the stomachs of the people were filled and their bank accounts started, Berlin would have woven political strands into the economic bonds which held these non-Germans to the German empire, and eventually absorb all these nations into the Confederation of Central Europe. If this vast project could be accomplished without war, the German Emperor could go to his grave under the cover of sanctimonious peace. But the whole structure of this colossal scheme was built on a foundation of the German war machine and the expansive commercial and industrial system of the German empire. In case of war, the plan contemplated further immediate annexation of territory which would not have been necessary under the scheme of benevolent absorption. In case of war, necessarily involving France and Russia, and some of the smaller nations, say Serbia and Belgium, the plan proposed to grasp western European territories also.

In other words, the plan, sanctioned by the German Emperor and his closest advisers, contemplated raising Germany to a world power of the first magnitude. It contemplated placing under the German imperial crown new territory to the extent of 3,303,515 square kilometers, occupied by a population numbering 112,881,000, of whom a little more than 12,000,000 were Germanic and German-speaking. These vast dominions were to be ruled by 68,000,000 Germans of the empire which at the beginning of the war occupied 540,858 square kilometers. [Excerpted from an article by John G. Holms in *Asia* for August.]

MILWAUKEE

MILWAUKEE has 14 tanning and leather dressing plants; one of them is as large as any in the world, and two or three others are very large. It has 27 shoe manufacturing plants, 16 glove and mitten manufacturers, 14 trunk and bag manufacturers and a score of other manufacturers of leather products. This city tans more leather than any other in the United States, and far more than all Canada. Its manufactures of leather gloves and mittens increased 800 per cent in ten years, making Milwaukee second only to the twin cities of Gloversville-Johnstown (N. Y.) in this line of manufacturing.

The manufacture of beer, which is commonly associated with

Milwaukee, has fallen to 4th place among the city's industries. In recent years iron and steel industries have led all others. No less than j0 manufacturing concerns manufacture iron and steel products in a large way. This activity is in keeping with the situation in all of the cities on the Great Lakes. This group of cities is rapidly rising to a dominating position in the manufacture of iron and steel. So advantageously are coal and iron ore brought together on the shores of these lakes that the Pittsburg district is being hard pressed to maintain its leadership. Milwaukee is sharing with the Buffalo district, Cleveland, Detroit, Toledo, Gary, and Chicago, in an enormous expansion of the iron and steel industry.

The flour-milling industry, at one time the leading one in Milwaukee, has greatly declined since Wisconsin ceased to be a wheat-growing state. Once Milwaukee had 14 flour mills and was the second city in the United States in this industry. Only one of the flour mills is still operating as such.

Slaughtering and meat packing remains one of the leading industries of the city. The major part of this is done in the suburb of Cudahy.

The coal trade of Milwaukee is very large. Some 28 coal docks skirt the harbor. They handle over five million tons of coal yearly. This is by far the biggest item in Milwaukee's tonnage. Shipments by lake from Milwaukee are no longer very large.

Three lines of car ferries connect the city with railway terminals on the Michigan side of the Lake. These ferry boats carry 30 to 35 freight cars at a time; this device considerably shortens the distance to Detroit, Buffalo, and the East as compared with the trip around the southern end of the lake by way of Chicago.

Milwaukee is one of the great primary grain markets of the country. In 1916, the city received 86,000,000 bushels of grain, over 55,000 car loads. Of about 60,000,000 bushels of grain shipped out of Milwaukee, only 3,000,000 bushels went by lake boats, to lower lake ports, while 43,000,000 bushels went by rail and 13,000,000 by car ferry.

R. H. W.

BUENOS AIRES

THE following description of the greatest of South America cities is excerpted from Professor Hiram Bingham's delightful book, "Across South America." *

"A generation ago the traveller to Buenos Aires was obliged to disembark in the stream seven or eight miles from the city,

proceed in small boats over the shallow waters, and then clamber into huge ox-carts and enjoy the last mile or two of his journey as best he could. Since then, extraordinary harbor improvements, costing millions of dollars, have been completed, and ocean steamers are now able to approach the city through dredged channels. Yet such has been the phenomenal growth of the port that the magnificent modern docks are already overcrowded.

"Buenos Aires will always maintain her political and commercial supremacy. She is not only the capital of Argentina, but out of every five Argentinos, she claims at least one as a denizen of her narrow streets. Already ranking as the second Latin city in the world, her population equals that of Madrid and Barcelona combined.

"Hardly has one left the docks on the way to the hotel before one is impressed with the commercial power of this great city. Your taxicab passes slowly through crowded streets where the heavy traffic retards your progress and gives you a chance to marvel at the great number of foreign banks, English, German, French, and Italian, that have taken possession of this quarter of the city.

"These streets may be so narrow that vehicles are only allowed to pass in one direction, but the shops are first class in every particular and include the greatest variety of goods, from the latest creations of Parisian millinery to the most modern scientific instruments. Fine book shops, large department stores, gorgeous restaurants, expensive to the last degree, emphasize the wealth and extravagance of the upper classes.

"There are many theatres and they have a brilliant season, which begins in June. The pleasure-loving Portenos are willing to pay very high prices for the best seats, and managers can offer good salaries to tempt the best performers to leave Europe. Variety shows are popular and carried to an extreme with which we are not familiar in the United States. Some of them are poor copies of questionable Parisian enterprises.

"The Porteno has not only forgotten his religion, he seems also to have lost the pleasing manners of his Castilian ancestors. I have been in eight South American Capitals and in none have I seen such bad manners as in Buenos Aires. To be sure, none of them are as rich and prosperous.

"Here the newly rich are in full sway and their ideas and instincts seem to predominate. On Sunday afternoon, all the world dashes madly out to the race course, where it exercises its

* Houghton, Mifflin & Co., Boston, 1911.

passion for gambling to the fullest capacity. In the Jockey Club inclosure are gathered the youth and beauty, the wealth and fashion of the city. The races that I attended drew an audience of thirty thousand. One race had a first prize amounting to fifteen thousand dollars. Facilities for betting were provided on an elaborate scale. The gate receipts and the proceeds of the "percentage" are enormous and have enabled the Jockey Club to build one of the most luxurious and extravagant club houses in the world.

"Very few wealthy families have a long-established social position. Culture and refinement are at a discount. Otherwise it is difficult to imagine how any society can tolerate such artificiality.

"It is hardly necessary to speak of the more usual evidences of great wealth, palatial residences that would attract attention even in Paris and New York, charming parks beautifully laid out on the shores of the great Rio de la Plata, and a thousand luxurious automobiles of the latest pattern carrying all they can hold of Parisian millinery."

CURRENT MATERIAL FOR THE GEOGRAPHY TEACHER

Increasing Dependence on the Tropics

MORE than 1000 million dollars' worth of tropical products were brought into the country during the fiscal year 1916. The exact total was $1,060,850,416, according to official figures of the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, and this was a decided increase over the $807,642,182 of 1915, the $505,511,552 in 1905, and the $303,476,706 in 1895.

These large and rapidly increasing purchases of tropical products consist mainly of foodstuffs and raw materials not produced in the United States and of certain others grown in the insular territories. Sugar heads the list, with imports valued at $314,000,000 in the fiscal year 1916. That sum represents an increase of $57,000,000 over 1915 and $156,000,000 over 1914. India rubber, gutta percha, gutta joolatong and other substitutes for rubber showed imports in 1916 valued at $159,000,000 as against $86,000,000 in the preceding year. Imports of raw silk amounted in value to $124,000,000, a 50 per cent increase over 1915; coffee, $116,000,000, an increase of about 8 per cent over 1915; fibers other than flax, $56,000,000, an increase of almost 50 per cent; fruits and nuts, $55,000,000, a very slight increase; raw cotton,

$40,000,000, an increase of about 70 per cent; tobacco and manufactures of, $38,000,000, a decrease of about $2,750,000; and cocoa and chocolate, $36,000,000, an increase of 50 per cent over 1915. Other important items in this group are vegetable oils, $34,000,000, against $25,000,000 in 1915; tea, $21,000,000, compared with $18,000,000 last year; gums, $15,000,000, against $12,000,000 in 1915; dyewoods and extracts, $10,000,000, against $5,000,000 in 1915; spices, $9,000,000, against $6,000,000 in 1915; indigo, $8,000,000, against $1,600,000 in the preceding year; rice, $6,200,000 against $6,400,000 in 1915, and cabinet woods, $4,000,000, against $4,300,000 in 1915. Feathers, ivory, sago and tapioca, vanilla beans, licorice root, opium, quinine-bearing barks, and sponges, in sums varying from about $3,000,000 down to less than $1,000,000 each, complete the list.—[*Commercial America.*]

Trade of the Philippines

The trade of the Philippine Islands is having a steady growth of quantity and quality. The changes in the currents of the world trade that recent developments of the war have made are seen as plainly in the Far East as anywhere else. The hindrances to free exchange and transportation of the long-voyage commerce of the world are causing a growth of local commerce. There are important increases in the exportations of Philippine products that are not directly traceable to war-influences, but they are probably indirectly due to the revolutionary differences in the whole world's trade. Whatever the causes, the Philippines are exporting largely and they are exporting products in a higher condition of industrial preparation.—[*The Americas.*]

Seventy-Five Million Tons of Ore Mined in 1916

The iron ore mined in the United States in 1916 reached a total of 75,167,672 gross tons, the greatest annual output ever made. The shipments from the mines in 1916 were 77,870,553 gross tons, valued at $181,902,277. The quantity mined in 1916 was more than 19,600,000 tons greater than that mined in 1915. The increases in quantity and in value of iron ore shipped in 1916 amounted to about 40 and 80 per cent, respectively. The average value per ton at the mines in 1916 was $2.34, as against $1.83 in 1915. These figures, which were compiled under the direction of E. F. Burchard, of the United States Geological Survey, include for 1916 only iron ore containing less than 5 per cent of manganese.

Iron ore was mined in 24 States in 1916 and 23 in 1915. Minnesota, Michigan, and Alabama, which have for many years

produced the largest quantities of iron ore, occupied in 1916 their accustomed places.

The Lake Superior districts mined nearly 85 per cent of the total ore in 1916 and the Birmingham district about 8 per cent. No other district except the Adirondack mined as much as 1,000,000 tons. The increase in production in 1916 was especially marked in the Adirondack and Chattanooga districts—54 and 55 per cent respectively—but every district showed an increased output over that of 1915.

All the ranges in the Lake Superior district mined a larger quantity of iron ore in 1916 than in 1915, and the largest increases were in the Gogebic and Menominee ranges—54 and 43 per cent respectively. The output of the Cuyuna range exceeded 1,500,000 tons for the first time.

There were 12 mines in the United States that produced more than 1,000,000 tons of iron ore each in 1916, five more than in 1915. First place in 1916 was held by the Hull-Rust mine, at Hibbing, Minn; second place by the Red Mountain group, near Bessemer, Ala.; third place by the Fayal mine, at Eveleth, Minn.; and fourth place by the Mahoning mine, at Hibbing, Minn. The production of these mines in 1916 was, respectively, 7,658,201, 2,899,588, 2,252,008, and 2,215,788 tons. The increase at the Hull-Rust was 232 per cent, making the production of this mine more than one-tenth of all the ore mined in the United States in 1916. These records illustrate the rapidity with which the rate of output of mines in the Lake Superior district may be increased. None but open-pit mines could be made to respond to demand to such a degree.

Deep Salt Bed

In Kansas a deep well struck rock salt at 690 feet below the surface and penetrated 600 feet of rock salt in beds from 5 to 60 feet thick, according to the United States Geological Survey, Department of the Interior. A large area in this State is underlain by salt, which is mined by many shafts and obtained by pumping brine. Drilling for oil in Texas and Louisiana has revealed the presence of tremendously thick deposits of rock salt at a depth of a few hundred feet. Thicknesses of 2,000 feet are common, and one drill hole passed through more than 3,000 feet of rock salt. Most of the salt made in Utah is produced by evaporating the water of Great Salt Lake, and in California by evaporating sea water. These sources are inexhaustible, and the limit of production by solar evaporation will therefore never be reached.

RECENT PUBLICATIONS

BRAZIL TODAY AND TOMORROW. By L. E. Elliott, Literary Editor of the Pan-American Magazine. X+338 pages; illustrated. The Macmillan Company, New York, 1917. $2.25.

The author has spent several years in Brazil and has been associated with South American interests generally through her connection with the Pan-American Magazine. Seventy-five pages are given to the history of Brazil and fifty to social conditions. Transportation, Agriculture, Manufacturing, Finance, and Commerce are all treated with considerable fullness. The information is brought down almost to date, and is, on the whole, reliable. There is a tendency to give an unduly optimistic view of affairs in Brazil, and to omit facts which are unfavorable to that country. One feels that the book may be the truth, yet not the whole truth. The two maps intended to show the value of agriculture and industrial products by states, are evidently based in part upon estimates that are too liberal.

THE FRONTIERS OF LANGUAGE AND NATIONALITY IN EUROPE. By Leon Dominian of the American Geographical Society. Published for the Society by Henry Holt and Company, New York, XVIII+375 pages; 7x10 inches. 1917.

Mr. Dominian is of Armenian descent, a graduate of Robert College, Constantinople, and is particularly well equipped for carrying on investigations in the field with which the book deals. There are many colored maps, sketch maps, half tone cuts and other illustrations. The maps are excellently drawn and printed. The point of view is distinctly geographical. In the preface the author says: "Never has it been realized better than at the present time that an ill adjusted boundary is a hatching oven for war. A scientific boundary, on the other hand, prepares the way for permanent good will between peoples." Mr. Madison Grant has written an Introduction to the book in which he says: "In the present work the problems arising from the distribution of the main European languages and from their relation to political boundaries are discussed with clearness and brilliancy. The text embodies a vast collection of facts and data laboriously collected by the author, who has applied to the subject his familiarity with Eastern languages, as well as an impartial vision which is hard to find in these days * * * ."

The book is a highly valuable contribution to our rather imperfect knowledge of a big subject. In binding and general make-up it displays the same excellence as Dr. Bowman's "Andes of Southern Peru," issued some time ago by the American Geographical Society.

QUESTIONS ON ASIA

1. Name and locate (a) the independent nations of Asia; (b) ten large rivers; (c) the bounding waters; (d) four important flood plains.
2. Locate: Lake Baikal, Aral Sea, Himalaya Mts., Mongolia, Tibet, Manchuria, Chosen, Hondo, Formosa, Malay Peninsula, Ceylon, Burmah, Assam, Peking, Shanghai, Hongkong, Hankow, Canton, Tokio, Yokohama, Osaka, Nagasaki, Singapore, Calcutta, Colombo, Aden, Madras, Bagdad, Jerusalem, Bombay, Damascus, Smyrna, Vladivostok, Port Arthur, Delhi, Manila, Batavia.
3. What parts of Asia are (a) tundras, (b) steppes, (c) plateaus, (d) deserts, (e) agricultural lands?
4. What parts of Asia are in the monsoon region? Describe the monsoons.
5. Make a list of ten significant facts about China. Can you account for each of them?
6. What are China's most pressing needs? What are China's principal contributions to foreign trade? Extent of known mineral resources?
7. In what lines has Japan made remarkable progress? Wherein lies Japan's strength? weakness? Her area and population? Proportion of arable land? (15 per cent.) Chief crops? Mineral resources? Most pressing needs? Annual value of foreign trade? Development of manufacturing?
8. India; Size? Population? Climatic conditions? Surface features? Races? Government? Religions? Leading cities? Five important crops? Three or four chief exports? What minerals are produced? To what extent is manufacturing developed? How does India rank as a cattle grower? cotton producer? tea producer? jute producer? For what is jute used? Where is the tea of India largely grown? jute? rice? wheat? Why does England attach so much importance to India?
9. Why is the per-capita foreign trade of Asiatic countries small? Why are western nations so anxious to develop their trade with Oriental nations?
10. Why was the building of the Trans-Siberian railway of great importance to Russia?
11. Why is Japan very desirous of gaining a foot hold in China?
12. Give an account of the expansion of rubber plantations in southeastern Asia and near-by islands.
13. Where are the great tin mines of southeastern Asia?
14. What does southwestern Asia contribute to the world's commerce? Why is the amount not large?

FOREIGN TRADE OF THE UNITED STATES.

Imports	1914	1917*
Foodstuffs, crude	$ 247,948,000	$ 335,000,000
Foodstuffs, manufactured	227,644,000	346,000,000
Raw material for manufacturing	632,866,000	1,102,000,000
Manufactures for manufacturing	319,275,000	465,000,000
Manufactures ready for use	449,318,000	369,000,000
Miscellaneous	16,874,000	16,000,000
Total imports	$1.893,926,000	$2,633,000,000
Exports (domestic)		
Foodstuffs, crude	$ 137,495,000	$ 522,000,000
Foodstuffs, manufactured	293,218,000	734,000,000
Raw material for manufacturing	792,716,000	737,000,000
Manufactures for manufacturing	374,224,000	1,190,000,000
Manufactures ready for use	724,908,000	2,935,000,000
Miscellaneous	7,122,000	98,000,000
Total domestic exports	$2,329,684,000	$6,216,000,000
Foreign mdse. exported	34,895,000	63,000,000
Total exports	$2,364,579,000	$6,279,000,000

*For year ending in June.

Imports from—	1914	1917
Europe	$ 895,603,000	$ 601,000,000
North America	427,399,000	775,000,000
South America	222,677,000	534,000,000
Asia	286,952,000	606,000,000
Africa	19,149,000	55,000,000
Oceania	42,144,000	62,000,000
Grand total	$1,893,926,000	$2,633,000,000
Exports to		
Europe	$1,486,499,000	$4,328,000,000
North America	528,645,000	1,137,000,000
South America	124,540,000	257,000,000
Asia	113,426,000	376,000,000
Africa	27,905,000	78,000,000
Oceania	83,568,000	103,000,000
Grand total	$2,364,579,000	$6,279,000,000